**Amended Claims under PCT Article 34**

1. (amended) A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a plurality of partition walls into a gasification furnace, a main combustion chamber of a combustion furnace and a heat recovery chamber of said combustion chamber;

a revolving flow of a fluidized medium in which an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in the fluidized-bed in a certain region, thus generating an upward flow of the fluidized medium, and a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in the fluidized-bed in another region, thus generating a descending flow of the fluidized medium, is formed in at least one of said gasification furnace and said main combustion chamber;

a circulating flow of the fluidized medium is formed between said gasification furnace and said main combustion chamber;

a circulating flow of the fluidized medium is formed between said heat recovery chamber and said main combustion chamber; and

a heat transfer surface is disposed in a fluidized-bed of said heat recovery chamber;

wherein oxygen content of a fluidizing gas supplied to a furnace bottom of said gasification furnace is equal to or lower than a theoretical oxygen demand of a supplied combustible material.



ATTACHMENT C

2. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a first partition wall into a gasification furnace and a combustion furnace;

upper and lower openings are formed in said first partition wall so that said gasification furnace and said combustion furnace communicate with each other;

an intense fluidizing region and a weak fluidizing region of a fluidized medium are formed in said gasification furnace and said combustion furnace;

said intense fluidizing region of the fluidized medium in one of said furnaces and said weak fluidizing region of the fluidized medium in the other of said furnaces are located adjacent to each other with said first partition wall interposed therebetween;

said combustion furnace is divided by a second partition wall into a main combustion chamber and a heat recovery chamber;

upper and lower openings are formed in said second partition wall so that said main combustion chamber and said heat recovery chamber communicate with each other; and

a weak fluidizing region of the fluidized medium is formed in said heat recovery chamber and a heat transfer surface is disposed in said heat recovery chamber.

3. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a first partition wall into a gasification furnace and a combustion furnace;

said first partition wall has openings so that said gasification furnace and said combustion furnace communicate with each other at lower portions thereof, and upper portions thereof near surfaces of fluidized-beds;

a diffusion device is provided on a furnace bottom of said gasification furnace so as to have different fluidizing velocities in the fluidized-bed;

an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in the fluidized-bed in a region near said first partition wall, thus generating an upward flow of the fluidized medium;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in the fluidized-bed in a region apart from said first partition wall, thus generating a descending flow of the fluidized medium, and combustible material is supplied to said weak fluidizing region;

said upward flow of the fluidized medium in said intense fluidizing region becomes partly a flow directed to said weak fluidizing region in the vicinity of a surface of the fluidized-bed, thus forming a revolving flow in the fluidized-bed in the gasification furnace, and partly a branched flow flowing in said combustion furnace through said upper opening of said first partition wall;

said combustion furnace formed by said first partition wall has a fluidized-bed portion which is divided by a second partition wall into a main combustion chamber and a heat recovery chamber;

said second partition wall has a lower opening through which said main combustion chamber and said heat recovery chamber

communicate with each other, an upper end of said second partition wall extends to a position near a surface of the fluidized-bed, and said main combustion chamber and said heat recovery chamber are integrated with each other in a freeboard section;

a diffusion device is provided on a furnace bottom of said main combustion chamber so as to have different fluidizing velocities in a fluidized-bed in said main combustion chamber;

a weak fluidizing region of the fluidized-bed is formed so as to have a substantially low fluidizing velocity in the fluidized-bed in a region near said first partition wall, and an intense fluidizing region is formed so as to have a substantially high fluidizing velocity in the fluidized-bed in a region near said second partition wall;

a descending flow of the fluidized medium is generated in said weak fluidizing region, and said descending flow is partly returned to said gasification furnace through said lower opening of said first partition wall, thus forming a circulating flow between said gasification furnace and said main combustion chamber;

an upward flow of the fluidized medium is generated in said intense fluidizing region, and said upward flow becomes partly a flow directed to said weak fluidizing region at a side of said first partition wall for thereby creating a revolving flow in the fluidized-bed of said main combustion chamber, and partly a branched flow which enters said heat recovery chamber beyond said second partition wall;

a diffusion device is provided on a furnace bottom of said heat recovery chamber so as to have a substantially low fluidizing

velocity in a fluidized-bed in said heat recovery chamber, thus forming a weak fluidizing region of the fluidized medium; and thus

the fluidized medium which has entered said heat recovery chamber from said main combustion chamber beyond said second partition wall descends in said heat recovery chamber, and returns to said main combustion chamber through said lower opening of said second partition wall, thus forming a circulating flow; and

a heat transfer surface is disposed in the fluidized-bed in said heat recovery chamber.

4. A fluidized-bed gasification and combustion furnace according to claim 3, wherein oxygen content of the fluidizing gas supplied to said furnace bottom of said gasification furnace is equal to or lower than a theoretical oxygen demand of the supplied combustible material.

5. A fluidized-bed gasification and combustion furnace according to claim ~~3 or 4~~, wherein the fluidizing gas supplied to said furnace bottom of said gasification furnace comprises any one of air, steam, oxygen and combustion exhaust gas, or a mixture of at least two of them.

6. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 5~~ claim 3, wherein said first partition wall forming a boundary between said gasification furnace and said combustion furnace has an inclined surface inclined toward

said gasification furnace in said gasification furnace side, and a vertical surface in said combustion furnace side.

7. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 6~~ Claim 3, wherein in said combustion chamber, said second partition wall forming a boundary between said main combustion chamber and said heat recovery chamber has an inclined surface inclined toward said main combustion chamber in said main combustion chamber side, and a vertical surface in said heat recovery chamber side.

8. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 7~~ Claim 3, wherein an incombustible material discharging port is provided at a furnace bottom between said gasification furnace and said combustion furnace.

9. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 7,~~ Claim 3 wherein in said combustion furnace, an incombustible material discharging port is provided at a furnace bottom between said main combustion chamber and said heat recovery chamber.

10. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 7,~~ Claim 3 wherein an incombustible material discharging port is provided at a furnace bottom between said gasification furnace and said combustion furnace, and in said combustion furnace, an incombustible discharging port is

provided at a furnace bottom between said main combustion chamber and said heat recovery chamber.

11. A fluidized-bed gasification and combustion furnace according to claim 8 ~~or 9 or 10~~, wherein said furnace bottom is inclined downwardly toward said incombustible material discharging port.

12. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 11,~~ claim 3 wherein in said combustion furnace, secondary air is supplied to a freeboard section of said combustion furnace.

13. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 12~~, claim 3 wherein in said combustion furnace, auxiliary fuel is supplied to said weak fluidizing region in said combustion furnace.

14. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 13~~, claim 3 wherein gases discharged from said gasification furnace and said combustion furnace are led to a slagging combustion furnace and mixed therein, and combustible gas and particles containing combustible content contained in said discharged gases are combusted at a high temperature of 1200°C or higher, thereby melting ash content.

15. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 14~~, claim 3 wherein said gasification

furnace and said combustion furnace are operated under a pressure equal to or higher than an atmospheric pressure.

16. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 13~~ claim 3, wherein said gasification furnace and said combustion furnace are operated under a pressure equal to or higher than an atmospheric pressure, and gases discharged from said gasification furnace and said combustion furnace are dedusted and then introduced into a gas turbine.

17. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 3 to 13,~~ claim 3, wherein said gasification furnace and said combustion furnace are operated under a pressure equal to or higher than an atmospheric pressure, and gases discharged from said gasification furnace and said combustion furnace are cooled and then dedusted, and then introduced into a gas turbine.

18. A fluidized-bed gasification and combustion system according to ~~any one of claims 15 to 17,~~ claim 15, wherein said fluidized-bed gasification and combustion furnace is housed in a pressure vessel in order to be operated at a pressure equal to or higher than an atmospheric pressure.

19. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a first partition wall into a gasification furnace and a combustion furnace;

said first partition wall has openings so that said gasification furnace and said combustion furnace communicate with each other at lower portions thereof, and upper portions thereof near surfaces of fluidized-beds;

in said gasification furnace, a diffusion device is provided on a furnace bottom of said gasification furnace so as to have different fluidizing velocities in the fluidized-bed;

an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in the fluidized-bed in a region near said first partition wall, thus generating an upward flow of the fluidized medium;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in the fluidized-bed in a region apart from said first partition wall, thus generating a descending flow of the fluidized medium, and combustible material is supplied to said weak fluidizing region;

said upward flow of the fluidized medium in said intense fluidizing region becomes partly a flow directed to said weak fluidizing region in the vicinity of a surface of the fluidized-bed, thus forming a revolving flow in the fluidized-bed in the gasification furnace, and partly a branched flow flowing in said combustion furnace through said upper opening of said first partition wall;

in said combustion furnace, a diffusion device is provided on a furnace bottom of said main combustion chamber so as to have different fluidizing velocities in a fluidized-bed;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in the

fluidized-bed in a region near said first partition wall, thus generating a descending flow of the fluidized medium, and an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in the fluidized-bed in a region apart from said first partition wall, thus generating an upward flow of the fluidized medium, whereby a revolving flow is formed in the fluidized-bed; and thus

the fluidized medium which has entered said gasification furnace from said combustion furnace through said upper opening of said first partition wall descends in the fluidized-bed by said revolving flow in said combustion furnace, and char which is ungasified component is combusted while it is descending, and the fluidized medium heated to a high temperature returns partly to said gasification furnace in the vicinity of the furnace bottom through said lower opening of said first partition wall to serve as a heat source for pyrolysis gasification in said gasification furnace.

20. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a first concentric partition wall into a cylindrical gasification furnace and an annular combustion furnace formed around said gasification furnace;

said first partition wall has openings so that said gasification furnace and said combustion furnace communicate with each other at upper portions thereof near surfaces of fluidized-beds, and lower portions thereof;

a diffusion device is provided on a furnace bottom of said cylindrical gasification furnace enclosed by said first partition wall so as to have different fluidizing velocities in the fluidized-bed;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in a cylindrical area of a fluidized-bed at a central portion of the furnace, thus generating a descending flow of the fluidized medium;

an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in an annular area of the fluidized-bed in a region near said first partition wall, thus generating an upward flow of the fluidized medium;

said upward flow of the fluidized medium partly flows in said combustion furnace through said upper opening of said first partition wall and partly flows toward said central weak fluidizing region, thus forming a revolving flow in the fluidized-bed of said gasification furnace, and combustible material is supplied to said weak fluidizing region;

said annular combustion furnace outside of said first partition wall has a fluidized-bed portion which is divided by a second partition wall in a radial direction into a plurality of main combustion chambers and a plurality of heat recovery chambers;

said second partition wall has a lower opening through which said main combustion chamber and said heat recovery chamber communicate with each other, an upper end of said second partition

wall extends to a position near a surface of the fluidized-bed, and said main combustion chamber and said heat recovery chamber are integrated with each other in a freeboard section;

in said main combustion chamber, a diffusion device is provided on a furnace bottom so as to have different fluidizing velocities in said fluidized-bed;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in the fluidized-bed, near said opening for communicating with said gasification furnace, in a central part of said main combustion chamber, thus generating a descending flow of the fluidized medium, said descending flow partly returns to said gasification furnace through said lower opening of said first partition wall, and partly flows toward an intense fluidizing region formed so as to have a substantially high fluidizing velocity, and then the fluidized medium forms an upward flow in said intense fluidizing region, thus forming a revolving flow in the fluidized-bed in said main combustion chamber, and said upward flow partly forms a branched flow flowing in said heat recovery chamber beyond said second partition wall;

a diffusion device is provided on a furnace bottom of said heat recovery chamber so as to have a substantially low fluidizing velocity in the fluidized-bed, thus forming a weak fluidizing region of the fluidized medium; and

the fluidized medium which has entered said heat recovery chamber from said main combustion chamber beyond said second partition wall descends in said heat recovery chamber, and returns to said main combustion chamber through said lower

opening of said second partition wall, thus forming a circulating flow; and

a heat transfer surface is disposed in the fluidized-bed in said heat recovery chamber.

21. A fluidized-bed gasification and combustion furnace according to claim 20, wherein oxygen content of the fluidizing gas supplied to said furnace bottom of said gasification furnace is equal to or lower than a theoretical oxygen demand of the supplied combustible material.

22. A fluidized-bed gasification and combustion furnace according to claim 20 ~~or 21,~~ wherein the fluidizing gas supplied to said furnace bottom of said gasification furnace comprises any one of air, steam, oxygen and combustion exhaust gas, or a mixture of at least two of them.

23. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 22~~ claim 20, wherein said first partition wall forming a boundary between said gasification furnace and said combustion furnace has an inclined surface inclined toward said gasification furnace in said gasification furnace side, and a vertical surface in said combustion furnace side.

24. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 23~~ claim 20, wherein in said combustion furnace, said second partition wall forming a boundary between

said main combustion chamber and said heat recovery chamber has an inclined surface inclined toward said main combustion chamber in said main combustion chamber side, and a vertical surface in said heat recovery chamber side.

25. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 24~~ claim 20, wherein an incombustible material discharging port is provided at a furnace bottom between said gasification furnace and said combustion furnace.

26. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 24~~ claim 20, wherein in said combustion furnace, an incombustible material discharging port is provided at a furnace bottom between said main combustion chamber and said heat recovery chamber.

27. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 24,~~ claim 20 wherein an incombustible material discharging port is provided at a furnace bottom between said gasification furnace and said combustion furnace, and in said combustion chamber, an incombustible discharging port is provided at a furnace bottom between said main combustion chamber and said heat recovery chamber.

28. A fluidized-bed gasification and combustion furnace according to claim 25 ~~or 26 or 27,~~ wherein said furnace bottom is inclined downwardly toward said incombustible material discharging port.

29. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 28,~~ Claim 20 wherein in said combustion furnace, secondary air is supplied to a freeboard section of said combustion furnace.

30. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 29~~, Claim 20 wherein in said combustion furnace, auxiliary fuel is supplied to said weak fluidizing region in said combustion furnace.

31. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 30~~, Claim 20 wherein gases discharged from said gasification furnace and said combustion furnace are led to a slagging combustion furnace and mixed therein, and combustible gas and particles containing combustible content contained in said discharged gases are combusted at a high temperature of 1200°C or higher, thereby melting ash content.

32. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 31~~, Claim 20 wherein said gasification furnace and said combustion furnace are operated under a pressure equal to or higher than an atmospheric pressure.

33. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 30~~, Claim 20 wherein said gasification furnace and said combustion furnace are operated under a pressure equal to or higher than an atmospheric pressure, and gases

discharged from said gasification furnace and said combustion furnace are dedusted and then introduced into a gas turbine.

34. A fluidized-bed gasification and combustion furnace according to ~~any one of claims 20 to 30~~ claim 20, wherein said gasification furnace and said combustion furnace are operated under a pressure equal to or higher than an atmospheric pressure, and gases discharged from said gasification furnace and said combustion furnace are cooled and then dedusted, and then introduced into a gas turbine.

35. A fluidized-bed gasification and combustion system according to ~~any one of claims 32 to 34~~ claim 32, wherein said fluidized-bed gasification and combustion furnace is housed in a pressure vessel in order to be operated at a pressure equal to or higher than an atmospheric pressure.

36. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a first concentric partition wall into a cylindrical gasification furnace and an annular combustion furnace surrounding said gasification furnace;

said first partition wall has openings so that said gasification furnace and said combustion furnace communicate with each other at upper portions thereof near surfaces of fluidized-beds, and lower portions thereof;

a diffusion device is provided on a furnace bottom of said cylindrical gasification furnace enclosed by said first partition wall so as to have different fluidizing velocities in the fluidized-bed;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in a cylindrical area of a fluidized-bed at a central portion of the furnace, thus generating a descending flow of the fluidized medium;

an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in an annular area of the fluidized-bed in a region near said first partition wall, thus generating an upward flow of the fluidized medium;

said upward flow of the fluidized medium partly flows in said combustion furnace through said upper opening of said first partition wall and partly flows toward said central weak fluidizing region, thus forming a revolving flow in the fluidized-bed of said gasification furnace, and combustible material is supplied to said weak fluidizing region;

a diffusion device is provided on a surface bottom of said combustion furnace so as to have different fluidizing velocities in said fluidized-bed;

a weak fluidizing region of the fluidized-medium is formed so as to have a substantially low fluidizing velocity in a region near said first partition wall, thus generating a descending flow of the fluidized medium;

an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in a region apart from said first partition wall, thus generating an upward flow of the fluidized medium; and

the fluidized medium which has entered said combustion furnace from said gasification furnace though said upper opening of said partition wall descends in the fluidized-bed, and char which is ungasified component is combusted while it is descending, and the fluidized medium heated to a high temperature partly returns to said gasification furnace in the vicinity of the furnace bottom through said lower opening of said first partition wall to serve as a heat source for pyrolysis gasification in said gasification furnace.

37. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a first concentric partition wall into a cylindrical gasification furnace and an annular combustion furnace surrounding said gasification furnace;

said first partition wall has openings so that said gasification furnace and said combustion furnace communicate with each other at upper portions thereof near surfaces of fluidized-beds, and lower portions thereof;

a diffusion device is provided on a furnace bottom of said cylindrical gasification furnace enclosed by said first partition wall so as to have different fluidizing velocities in the fluidized-bed;

a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in a cylindrical area of a fluidized-bed at a central portion of the furnace, thus generating a descending flow of the fluidized medium;

an intense fluidizing region of the fluidized medium is formed so as to have a substantially high fluidizing velocity in an annular area of the fluidized-bed in a region near said first partition wall, thus generating an upward flow of the fluidized medium;

said upward flow of the fluidized medium partly flows in said gasification furnace through said upper opening of said first partition wall and partly flows toward said central weak fluidizing region, thus forming a revolving flow in the fluidized-bed of said gasification furnace, and combustible material is supplied to said weak fluidizing region;

in a furnace portion having an annular gasification furnace outside of said first partition wall, a fluidized-bed portion is divided by a second partition wall in a radial direction into a plurality of gasification furnaces and a plurality of heat recovery chamber;

in said gasification furnace, a diffusion device is provided on a furnace bottom, and a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in a fluidized-bed, thus generating a descending flow of the fluidized medium and causing the fluidized medium to return to said combustion furnace through said lower opening of said first partition wall; and

the fluidized medium in said combustion furnace partly flows in said heat recovery chamber though said opening of said first partition wall, in said heat recovery chamber, a weak fluidizing region of the fluidized medium is formed so as to have a substantially low fluidizing velocity in the fluidized-bed by providing a diffusion device on a furnace bottom, thus forming a circulating flow in which the fluidized medium which has entered said heat recovery chamber from said main combustion chamber descends in said heat recovery chamber, and returns to said main combustion chamber through said lower opening of said first partition wall; and

a heat transfer surface is disposed in the fluidized-bed in said heat recovery chamber.

38. A fluidized-bed gasification and combustion furnace, characterized in that:

a fluidized-bed furnace is divided by a plurality of partition walls into a gasification chamber, a combustion chamber and a heat recovery chamber;

a revolving flow of a fluidized medium is formed in at least one of said gasification chamber and said main combustion chamber;

a circulating flow of the fluidized medium is formed between said gasification chamber and said combustion chamber; and

a heat transfer surface is disposed in a fluidized-bed of said heat recovery chamber.

39. A fluidized-bed gasification and combustion furnace according to claim 38, wherein a heat transfer surface for collecting heat from combustion gas is disposed in a freeboard section above said gasification chamber, said combustion chamber and said heat recovery chamber.